



A.D. 1838 N^o 7765.

S P E C I F I C A T I O N

OF

RICHARD RODDA.

FURNACES, FIRE-PLACES, AND STOVES.

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Furnaces, Fire-places, and Stoves.

RODDA'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, RICHARD RODDA, of the Parish of Saint Austle, in the County of Cornwall, Assay Master, send greeting.

WHEREAS Her present most Excellent Majesty Queen Victoria, by Her
5 Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Seventh day of August, One thousand eight hundred and thirty-eight, in the second year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Richard Rodda, Her especial licence, full power, sole privilege, and authority that I, the said Richard Rodda, my exors,
10 admors, and assigns, or such others as I, the said Richard Rodda, my exors, admors, or assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick upon Tweed, my Invention of "**CERTAIN IMPROVEMENTS IN**
15 **FURNACES, FIRE-PLACES, AND STOVES FOR THE CONSUMPTION OF SMOKE AND SAVING OF FUEL, AND IN THE MODE OF APPLYING THEM TO THE GENERATION OF STEAM, THE SMELTING OF METALS, AND OTHER PURPOSES ;**" in which said Letters Patent is contained a proviso that I, the said Richard Rodda, shall cause a particular description of the nature of my said Invention, and in what manner the same is to be performed,
20 to be inrolled in Her said Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

Rodda's Improvements in Furnaces, &c. for the Consumption of Smoke.

NOW KNOW YE, that in compliance with the said proviso, I proceed to describe the nature of my Invention, reference being had to the accompanying Drawings and the annexed description thereof:—

The principle of my Invention consists in certain arrangements of furnaces and fire-places by which the smoke from the more recently introduced fuel is made to pass through or amidst that portion of the fuel which has been longest ignited and is still in a state of vivid combustion, and under or through the flame of the fuel more recently ignited, whereby a portion or the whole of the inflammable particles of which the smoke is composed becomes ignited and is effectually consumed. The annexed Drawings represent my Invention as applied to various purposes. 10
 Figures 1, 2, and 3 represent the Invention as adapted to an ordinary waggon-shaped boiler, Figure 1 being a transverse section through the fire-place, and an end view of the boiler; Figure 2, a longitudinal section of the fire-place and boiler; and Figure 3, a plan or horizontal section of the fire-place. *a* is the boiler; *b*, the fire bars; *c*, the ordinary fire bridge; *d, d*, are two walls or partitions, preferably 15
 formed of Welch lump, and extending from the bridge towards the fire door about two-fifths of the length of the fire bars, and about four inches distant from the sides of the fire-place, so as to form the two small side flues *e, e*, which are open at the front end, but closed at the hinder end by the bridge being at that part continued up to the bottom of the boiler. The walls *d, d*, are at their 20
 upper sides in contact or nearly so with the bottom of the boiler, and are supported at each end by pieces of fire brick resting on the fire bars, so as to leave a narrow aperture or slit *f* of about two and a half inches in depth or more, according to the size of the fire-place between the under side of the walls and the top of the fire bars. *g* is a brick at the mouth of each of the side flues *e, e*, 25
 to prevent the ashes from entering into and choking the flues. *h* is an arch or inverted fire bridge, formed of Welsh lump or iron, extending from the one wall *d* to the other wall *d*, and leaving, between its under side and the top of the fire bars, a free space or passage *h*, of from six to eight inches in depth, whilst the top of the bridge is in contact or nearly so with the under side of the 30
 boiler. *m, m*, are a series of small apertures in the inverted fire bridge, which may either be left open or plugged with fire clay, according as may be found requisite. There is also a hole in or above the fire door furnished with a regulating valve to admit air into the furnace when required.

The fire-place is divided by the arch or inverted bridge *h* into two parts or 35
 compartments *n* and *o*; the compartment *n*, which is nearest to the fire door, I denominate the fire box, and the compartment *o* (which is nearest the bridge) the smoke burner, the fire box containing the most recently introduced fuel, and the smoke burner that which has been longest in the furnace, and there-

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fore in the most perfect state of combustion. The effect of this arrangement is that the smoke given out from the fresh fuel enters the side flues *l, l*, and passes through the slits or apertures *f* into the midst of the fuel in the smoke burner, and under or through the flame from the fuel in the fire box, which sweeps
 5 under the arch into the smoke burner, whereby the greatest portion, if not the whole, of the inflammable substances contained in the smoke becomes ignited and is consumed.

Although in illustration of my Invention I have represented it as applied to a waggon-shaped boiler, I do not confine its application to boilers of that
 10 description, as it is evident that the same arrangement is applicable to boilers of almost every form or construction.

I should also remark that in cases where the fire-place is of great width, the small side flues *e, e*, instead of being straight, may make one more turn under the boiler between properly disposed partitions or walls, so as to cause the smoke
 15 and heated air to circulate under a greater surface of the bottom of the boiler before entering into the smoke burner; and I would further remark that, instead of forming the partitions *d, d*, and the arch *h* of brick, either or all of them may be formed of a metallic vessel attached to the bottom of the boiler, and maintained constantly full of water either by means of suitable communi-
 20 cations formed between the highest part of the vessel and the water in the boiler, or by means of a separate supply pipe and discharge pipe.

Figures 4 and 5 represent a similar arrangement applied to a furnace for smelting metals, Figure 4 being a longitudinal section, and Figure 5 a horizontal section. *a* is the roof of the furnace; *b*, the fire bars; *c*, the bridge; *d, d*,
 25 two walls formed of Welsh lump, extending from the bridge towards the door about two-fifths of the length of the fire-place, and at a distance of about four inches from the sides of the fire-place, so as to form the two small side flues *e, e*, which are partially open in front, but at the hinder end are closed by the bridge being at that part carried up to the roof of the furnace.

30 These walls are supported at each end upon pieces of fire brick resting on the fire bars, so as to leave a slit or aperture *f* of about two and a half inches in depth between the under side of the wall and the top of the fire bars; the top of the walls are in contact or nearly so with the roof of the furnace. A brick *g* is placed across the opening of the side flues to prevent their becoming
 35 choked with ashes. *h* is an arch or inverted bridge extending from the one wall *d* to the other wall *d*, leaving an aperture *k* of six or eight inches in depth between its under side and the top of the fire bars; the top of the inverted bridge reaches to the roof or nearly so of the furnace; *m*, one of a number of small holes in the inverted bridge which may be left open or closed by fire clay.

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as circumstances may require. There is also a hole in or above the fire door furnished with a regulating valve to admit air to the furnace, when required. The space *n* between the inverted bridge *h* and the fire door, and which contains the recent fuel, I denominate the fire box, and the space *o*, which is between the inverted bridge and the bridge *c*, and which contains the most 5 vividly burning fuel, I call the smoke burner. For the convenience of removing the clinkers from the smoke burner, instead of employing a single set of bars extending the whole length of the fire-place, I employ two sets, one for the fire box and one for the smoke burner, the latter being sunk two or three inches below the former, and placed at right angles to them and transversely to the 10 length of the furnace, and an additional opening *n* is made to the ash pit, extending as high as the top of the slit *f*, or two or three inches above the top of the fire bars in the smoke burner. The effect of this arrangement is precisely similar to that of the arrangement shewn in Figures 1, 2, and 3; the smoke from the fresh fuel in *n* enters the side flues *e*, *e*, and passing through 15 the slits *f*, amidst the intensely ignited fire in *o*, and under or through the flame from the blazing fuel in *n*, which sweeps under the arch *h* into the smoke burner *o*, is thereby wholly or for the most part decomposed and its inflammable parts consumed. In cases where, from the comparatively small width of the fire-place, the side flues shewn in Figures 1 and 3 could not be conveniently 20 formed, I sometimes employ the arrangement exhibited in Figures 6 and 7, which represent my improvements as adapted to a marine boiler of the ordinary construction. Figure 6 is a longitudinal section of a portion of a boiler, and Figure 7 a transverse section of the same. *a* is the top or roof of the fire box; *b*, the fire bars; *c*, the ash pit; *d*, the flue; *e*, the partition which separates the ash 25 pit from the flue. On this partition is erected the bridge *f*, which is carried up to the roof of the fire box, and is perforated by a number of apertures of any convenient form, so that the bridge may retain the fuel and at the same time allow a ready passage to the flame and heated air into the flue. Within the flue, at a short distance from the partition *e*, is erected a second bridge *g* to 30 direct the flame and heated air against the roof of the flue. In the fire door is a hole furnished with a regulating valve to admit air to the furnace when required. The fuel in the fire box is at the hinder end heaped up against the bridge nearly to the roof of the fire box, and the smoke from the fresh fuel being by the draught of the flue drawn through the mass of fuel in a state of vivid 35 combustion, which is heaped against the bridge, the inflammable matter contained in the smoke becomes thereby ignited, and wholly or in a great measure consumed. A door *z* is placed in the lower part of the partition *e*, by which any ashes which may fall through the apertures in the perforated bridge *f* may be

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FIG. 1.

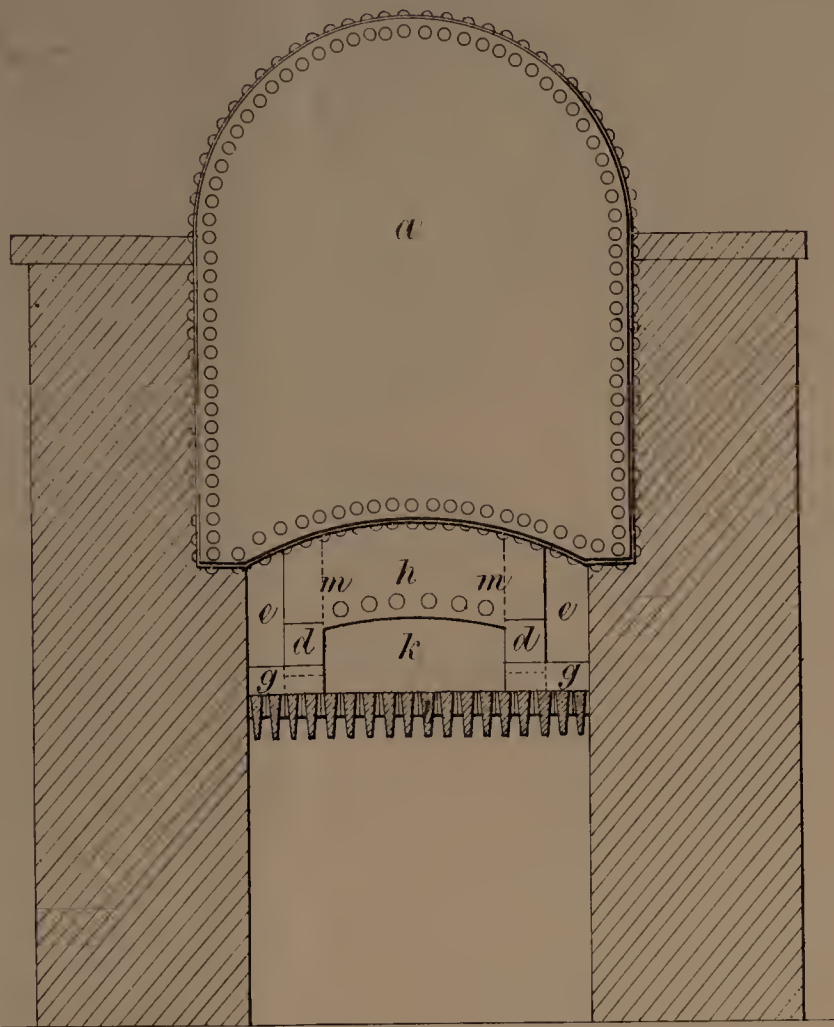


FIG. 2.

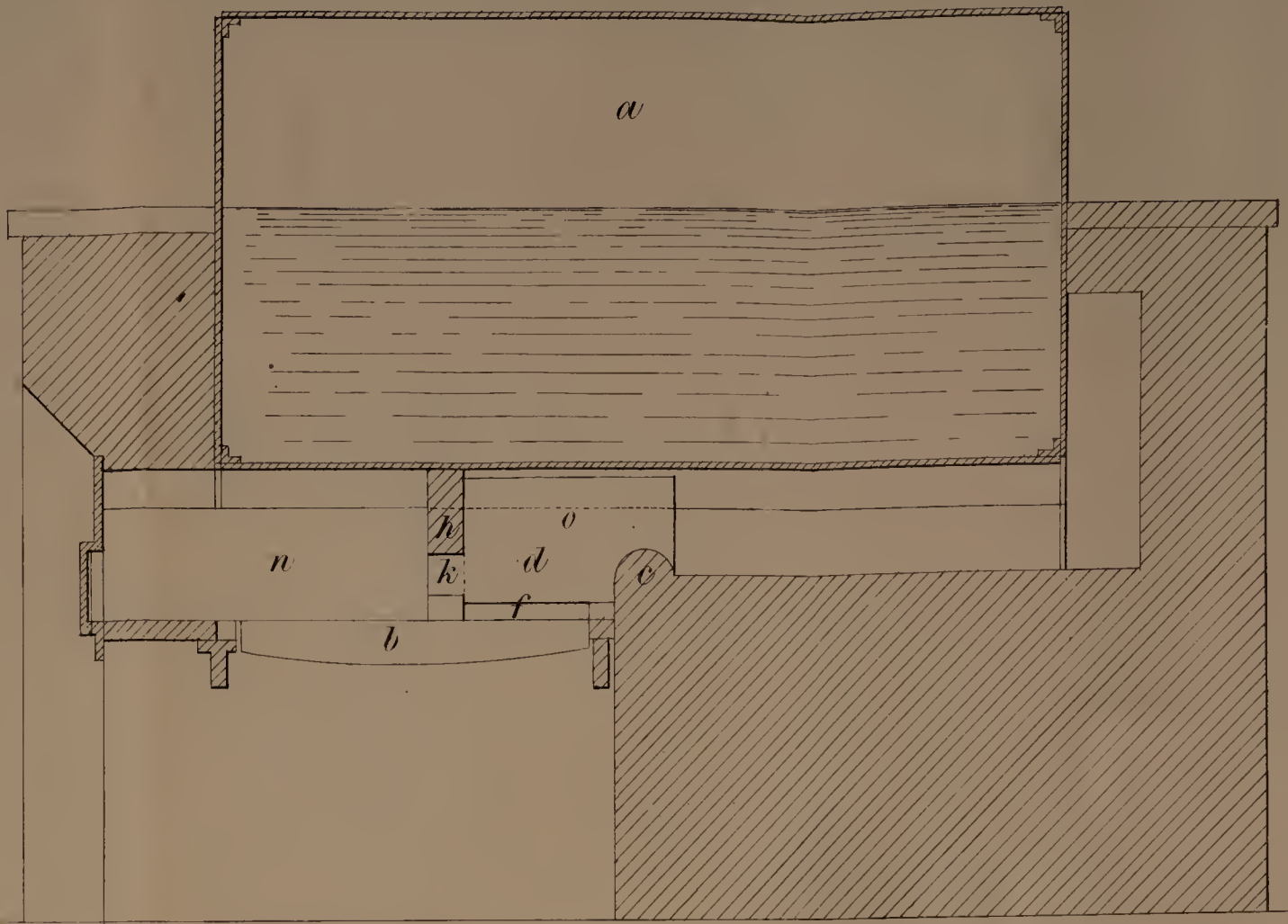


FIG. 3.

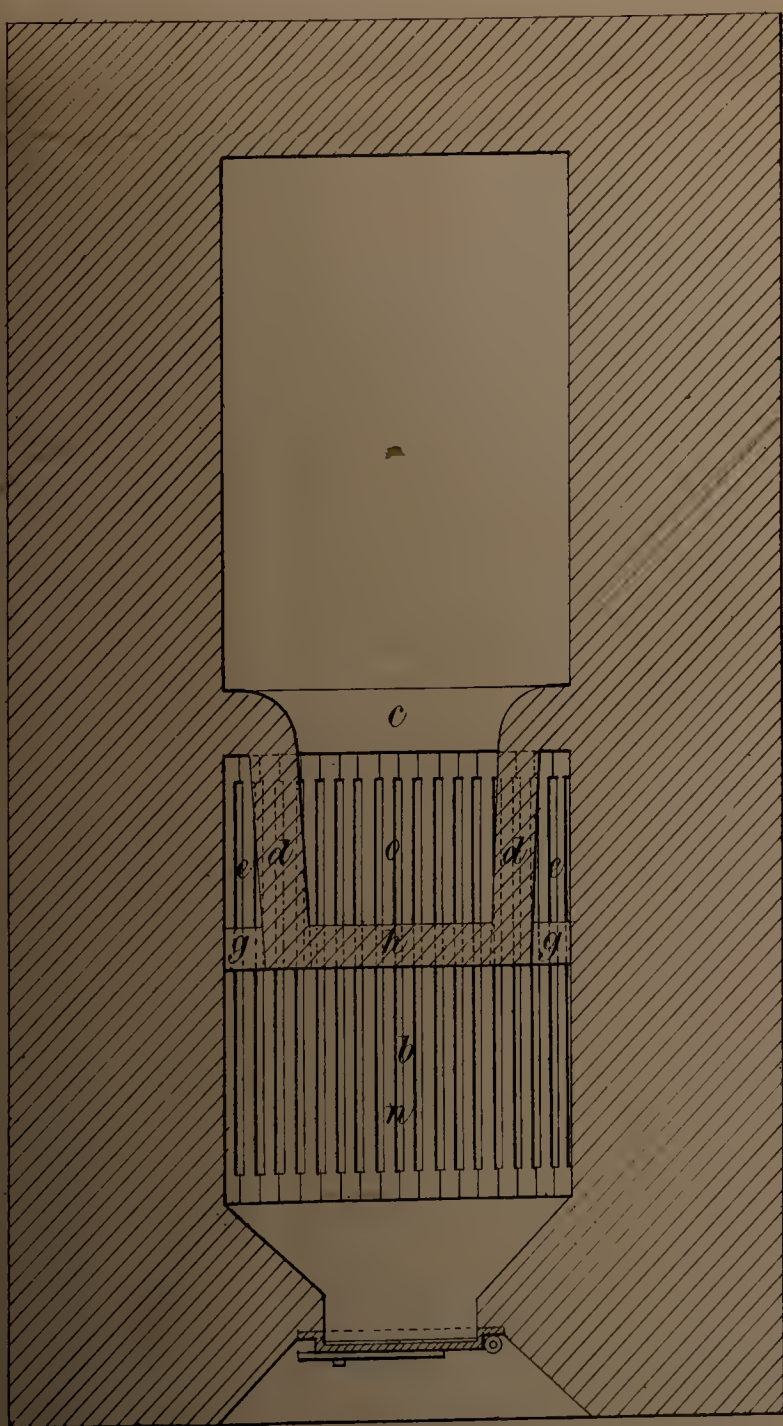


FIG. 4.

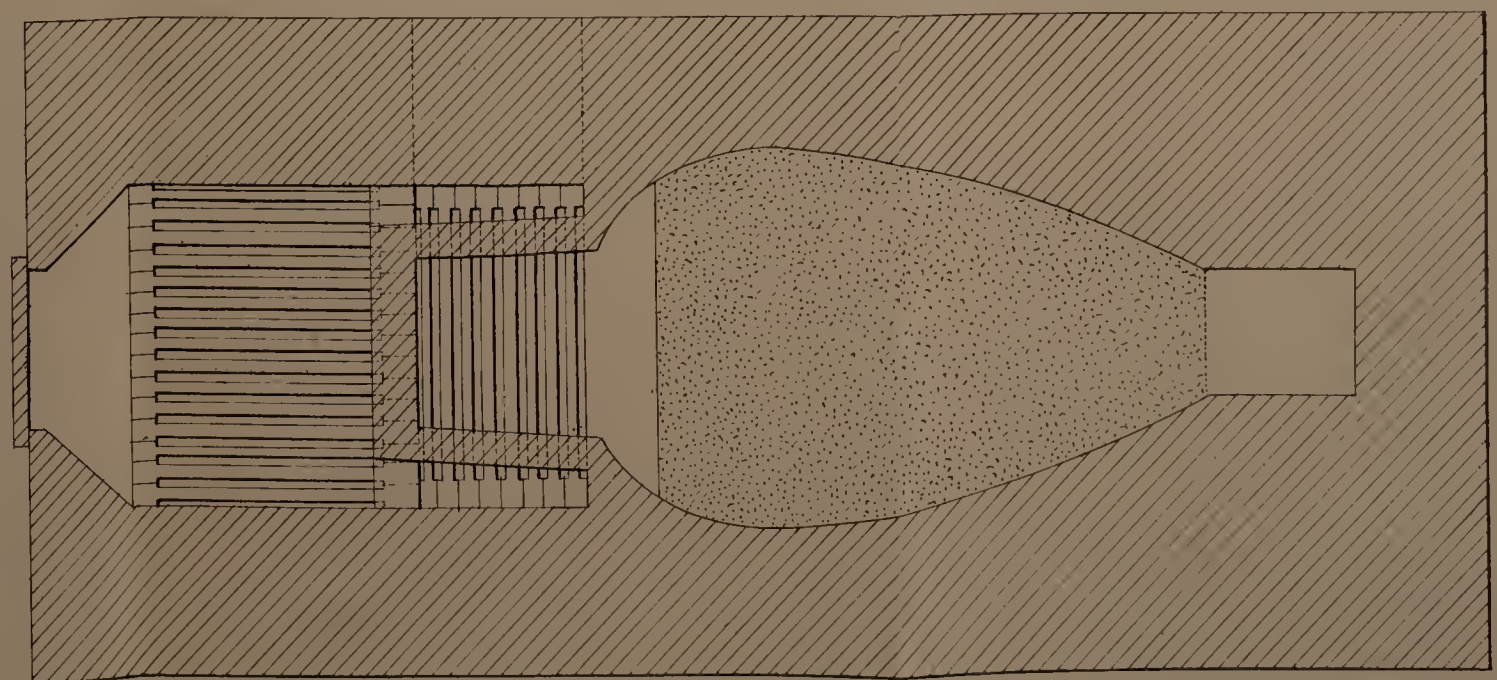
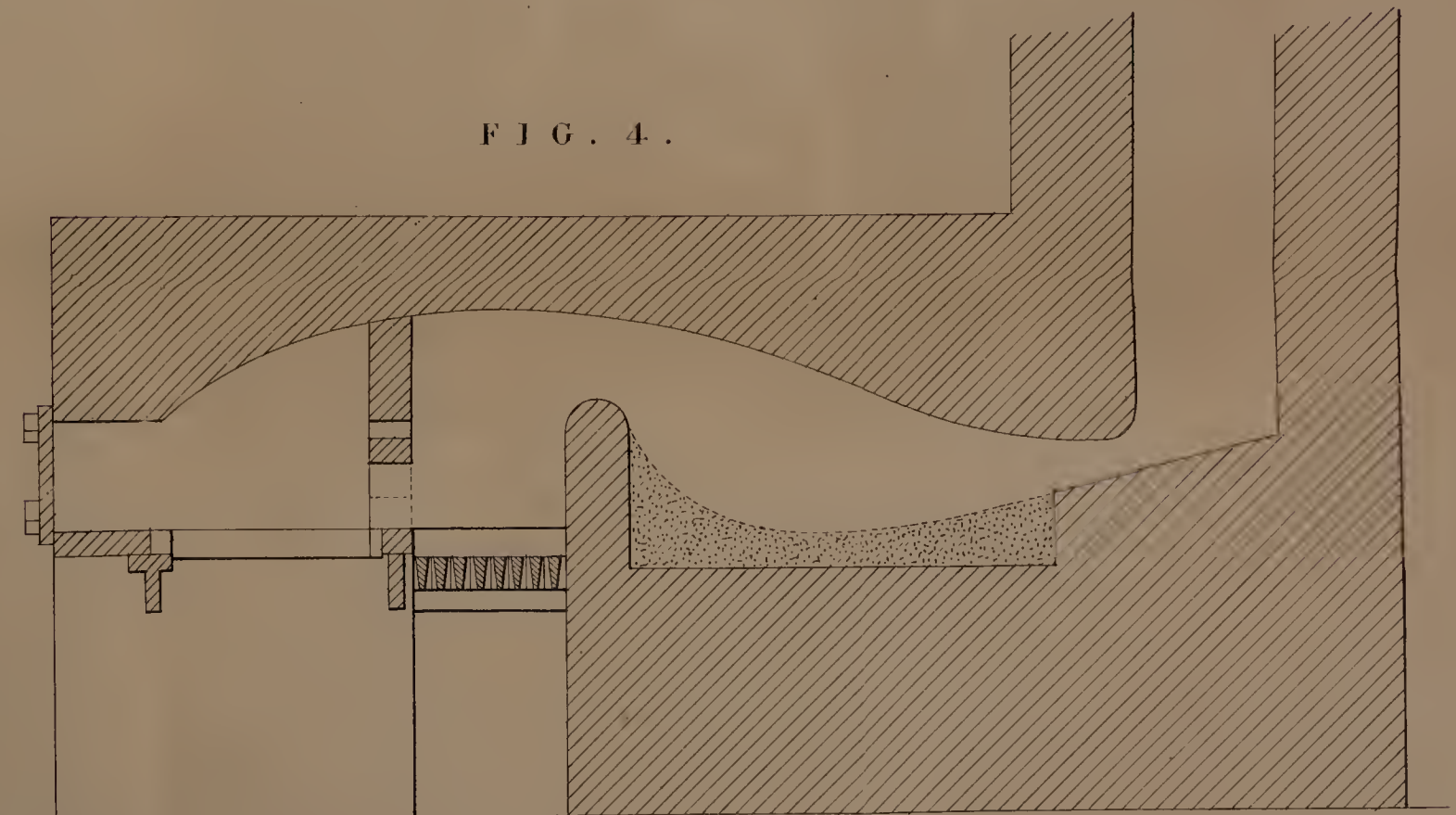


FIG. 5.

The Enrolled Drawing is colored.

FIG. 6.

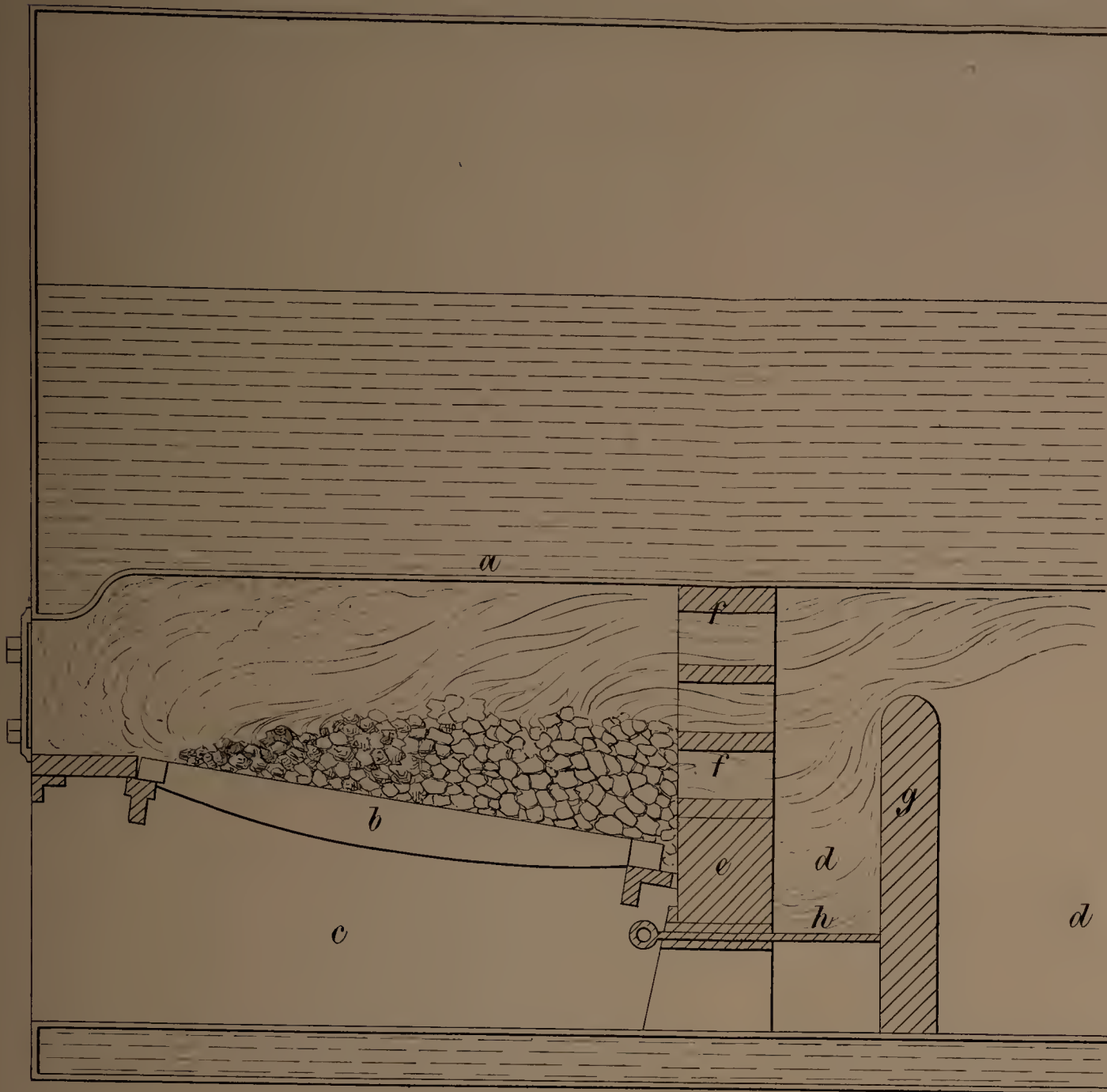


FIG. 7.

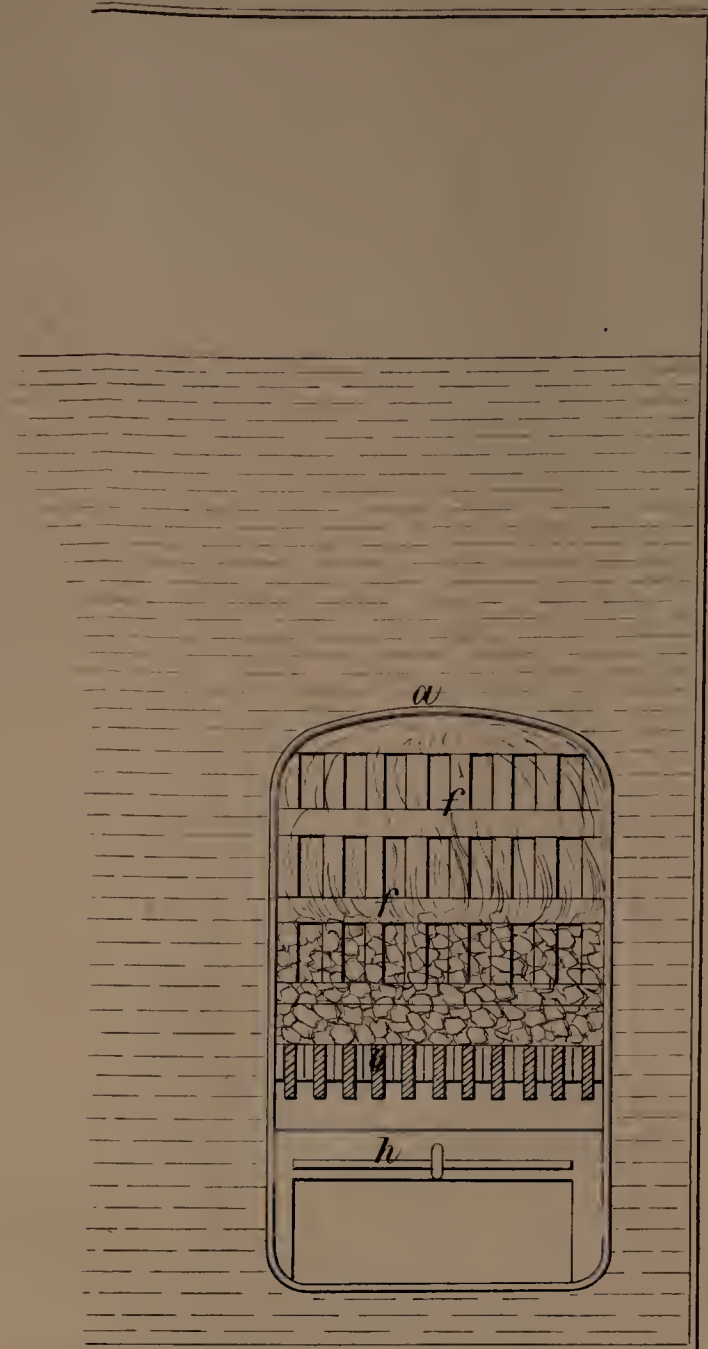


FIG. 8.

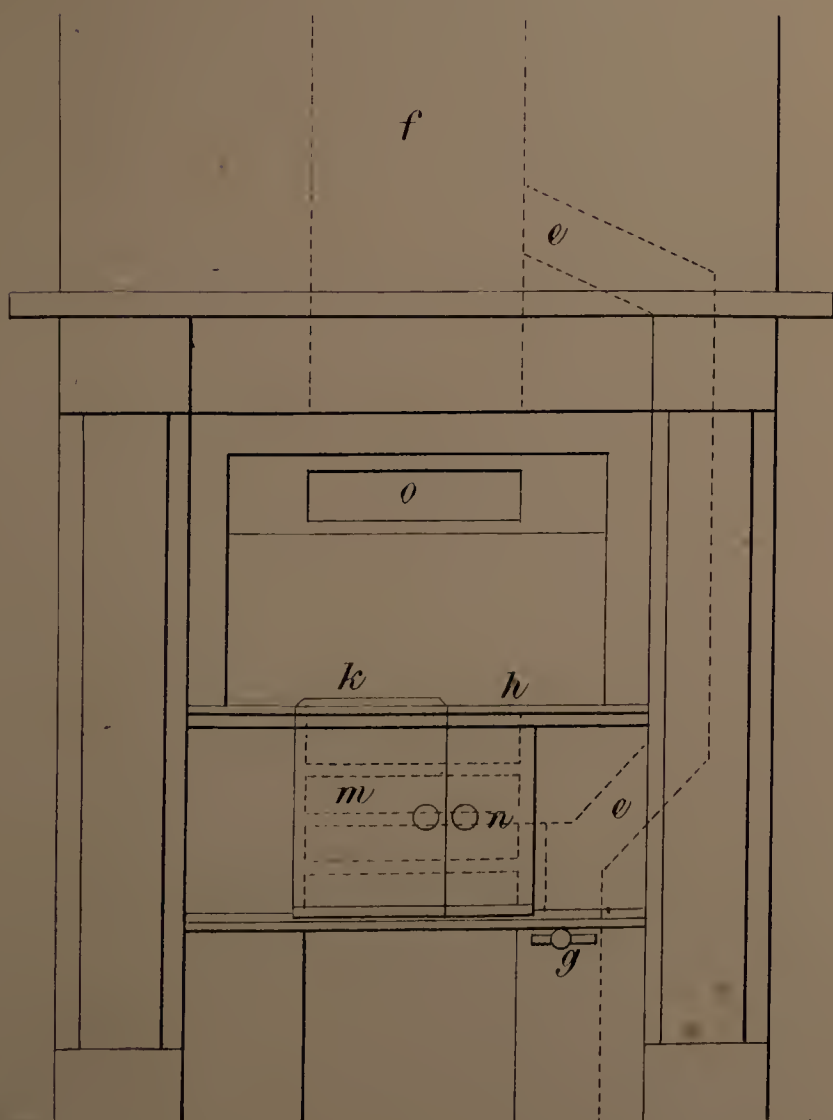


FIG. 9.

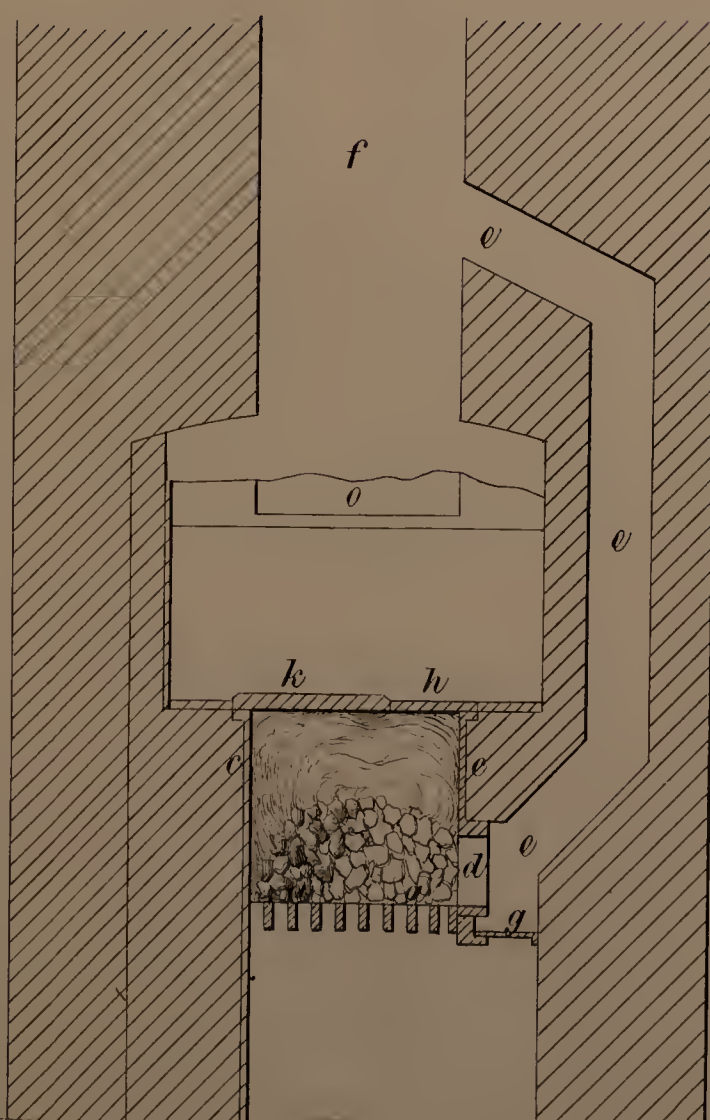
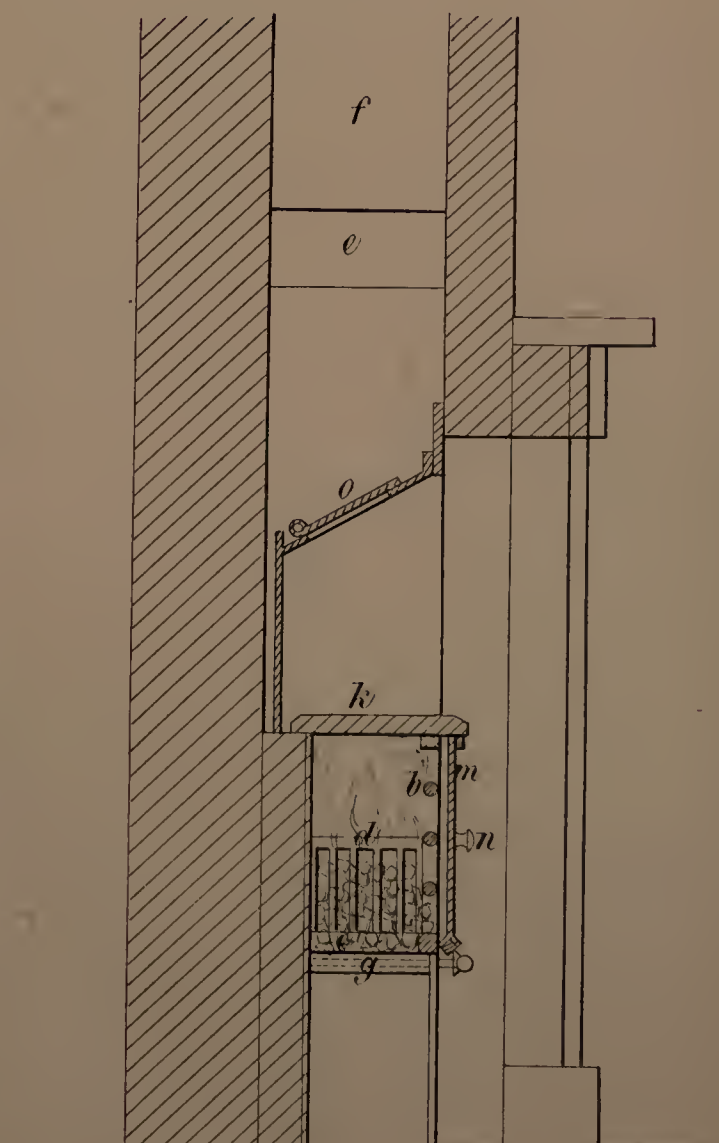


FIG. 10.



The Enrolled Drawing is colored.



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removed, and also access be had to the flue when required. The perforated bridge may be formed of metal, but I prefer Welsh lumps or fire brick for the purpose. Figures 8, 9, and 10 exhibit my improvements applied to a stove or grate. Figure 8 is a front elevation; Figure 9, a longitudinal section; and Figure 10, a transverse section. *a, a* are the bottom bars of the grate; *b*, the front bars; *c, c*, the two ends or sides of the grate, in one of which is an opening communicating with a flue *e*, which leads into the chimney *f*; the side opening is about half the depth of the grate, and the lower part is on a level with the bottom bars of the grate. In the front of this opening is a grating or perforated plate *d*, formed of fire tile or any other suitable substance, and serving to prevent the mass of fuel from falling into the flue *e*, and any small portion which may pass through the apertures of the plate may be removed at a small sliding door *g*; *h*, a hob at that end of the grate which is next the flue *e*, and covering about one-third of the top of the grate; *k*, a moveable lid covering the remainder of the top of the grate; *m*, a sliding or hanging door closing in that portion of the front of the grate which lies under the cover *k*; *n*, another door which incloses the remainder of the front of the grate; *o*, a register or damper in the chimney below the part where the side flue *e* opens into the chimney. In this grate the fuel is introduced at the cover part *k*, and that portion of the fuel which is the most intensely ignited is heaped up against that end of the grate which is in communication with the side flue, and the cover *k* being laid on, the damper *o* shut, and the doors *m* and *n* wholly or nearly closed, the smoke from the fresh fuel is in its passage to the flue *e* compelled to pass through the mass of burning fuel heaped against the perforated plate, whereby it is wholly or in a great measure decomposed, and its inflammable part consumed. When the fuel ceases to give out smoke, the doors *m* and *n* may be opened, the cover *k* removed, and the damper *o* opened; the grate then becomes an open fire-place, the heated air passing up the chimney. Although I have described the flue *e* as communicating with one end of the grate, it may communicate with the back instead, or with both ends, or with the back and end, perforated plates or gratings being placed accordingly.

Having thus described my Invention, and shewn various methods of applying it according to the purposes for which it may be required, I proceed to define the extent of my claims to Invention. First, I claim the combination of the inverted bridge *h* and the side flues *e, e*, as set forth in the description of the Figures 1, 2, and 3, and Figures 4 and 5, and the construction of which has been described, whereby the smoke from the fresh fuel is compelled to pass through a mass of intensely burning fuel and under a sheet of flame.

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Secondly, I claim the perforated bridge *f*, shewn in Figures 6 and 7, whether used alone or in conjunction with the second bridge *g*. Thirdly, for stoves, grates, or ranges, I claim the flue or flues *e*, whether at the sides or back of the grate, communicating with the lower part of the grate or fire chamber immediately above the bottom bars, when used in combination with doors or 5 shutters to inclose the front and top of the grate; but I do not limit myself to the particular form and construction shewn in Figures 8, 9, and 10.

In witness whereof, I, the said Richard Rodda, have hereunto set my hand and seal, this Sixth day of February, One thousand eight hundred and thirty-nine.

RICH^d RODDA. (L.S.)

SENIOR.

AND BE IT REMEMBERED, that on the Sixth day of February, in the year of our Lord 1839, the aforesaid Richard Rodda came before our said Lady the Queen in her Chancery, and acknowledged the Specification aforesaid, and all and everything therein contained and specified, in form above written. And 1 also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

Inrolled the Sixth day of February, in the year of our Lord One thousand eight hundred and thirty-nine.

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